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AVALIAÇÃO DA INFORMAÇÃO E DESINFORMAÇÃO EM SAÚDE NA INTERNET: ANÁLISE DA QUALIDADE E ACURÁCIA DO CONTEÚDO ONLINE UTILIZANDO O ÓLEO DE COCO COMO MODELO

PORTO ALEGRE
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Orientador: Prof. Fernando Gerchman

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RESUMO

Nos últimos anos, a rápida popularização da Internet proporcionou maior acesso à informação, sendo que, atualmente, é a primeira e uma das principais fontes para obtenção de informações de saúde. Por um lado, o maior alcance ao conhecimento torna os usuários mais aptos a participar ativamente de suas decisões de saúde. Por outro, o conteúdo disponível nas redes circula sem qualquer obrigatoriedade de controle editorial, sendo assim, as informações obtidas são, muitas vezes, imprecisas, inconsistentes, enviesadas e sem concordância com as evidências científicas atuais. Além disso, sabe-se que a população, de um modo geral, apresenta baixa alfabetização em saúde, comprometendo a adequada interpretação e emprego das informações adquiridas. Como consequência, os usuários tornam-se vulneráveis, o que pode acarretar implicações prejudiciais à nível de saúde individual e coletiva.

A desinformação em saúde, ou seja, a disseminação de informações erradas, imprecisas e tendenciosas amplificou-se com o uso da internet e decorre de um conjunto complexo de fatores, que vão desde características inerentes à psicologia humana até o forte caráter comercial que permeia todos os espaços de interatividade da rede. A infodemia, isto é, o excesso de informações conflitantes sobre determinado assunto, tem se mostrado um problema de saúde pública e a necessidade de desenvolver formas eficazes de combatê-la tem incentivado novas pesquisas em diversas áreas do conhecimento.

O óleo de coco é constituído mais de 90% de gordura saturada, que se relaciona com o aumento do LDL-c, um reconhecido fator de risco cardiovascular. Na última década, baseado em fracas evidências e pressupostos mecanismos de ação envolvendo o ácido láurico, seu principal ácido graxo, propagou-se intensamente na mídia o efeito benéfico do consumo do óleo de coco para a saúde cardiometabólica. Este fenômeno conduziu a um aumento expressivo na popularidade e no consumo mundial do óleo de coco. Portanto, o objetivo deste trabalho foi avaliar a qualidade e acurácia do conteúdo online disponível sobre o óleo de coco e saúde cardiometabólica que pode ser útil, tanto para desconstruir conceitos distorcidos a respeito deste alimento, bem como contribuir com uma metodologia de pesquisa para futuros estudos infodemiológicos na área da nutrição e definir modelos que ajudem elaborar estratégias de prevenção da desinformação em nutrição.

Demonstramos que as informações disponíveis em sites da internet sobre os benefícios do óleo de coco são, de uma maneira geral, tendenciosas, imprecisas e em desacordo com a melhor evidência científica vigente. Além disso, há características das mídias que se relacionam com uma maior qualidade do conteúdo, facilitando a identificação de informações mais precisas e acuradas. Estes dados demonstram a necessidade de um maior número de estudos que auxiliem no preenchimento de lacunas entre as evidências científicas e as informações disponíveis em mídias digitais, direcionando, de forma mais específica e precisa, as iniciativas de saúde pública no combate à desinformação, permitindo a promoção de informações em nutrição que levem o público a realizar escolhas alimentares mais adequadas.

ABSTRACT

Over the last years, the Internet use for health purposes evolved very quickly. Nowadays, it is the first and one of the main sources of health information. Online information can increase patients' knowledge and engagement in health decision-making strategies. However, health information flows without any regulation of editorial control, which facilitates the spread of inaccurate, inconsistent, out of date, biased and in disagreement with the best current evidence-based information. In addition, low levels of health literacy of general population expose them to misinterpretation and inappropriate use of the acquired online information.

The increased accessibility provided by the internet made possible misinformation spread faster and further than ever. It occurs as a consequence of a complex set of factors, such as human cognitive variables and strong commercial bias which permeates all web spaces. Infodemic, that is, the epidemic of online misinformation on a given subject, has proven to be a public health issue. The emerging demand to develop effective ways to debunk misinformation has encouraged new researches in several areas of knowledge.

Coconut oil consist of more than 90% saturated fat, related to increased LDL-c, a recognized cardiovascular risk factor. In the last decade, based on presumed mechanisms of lauric acid, coconut oil´s main fatty acid, and on some weak evidence, the beneficial effect of coconut oil consumption for cardiometabolic health has been intensely propagated in the Internet. This phenomenon led to a burst of popularity and consumption of coconut oil worldwide. The aim of this study was to assess quality and accuracy of the available online content about coconut oil consumption and cardiometabolic health, which can be useful both to debunk distorted concepts about coconut oil, as well as to contribute with methodologies for future infodemiological studies in nutrition and to define models to develop strategies to prevent future nutritional misinformation.

In this study, we demonstrated that information provided online on the benefits of coconut oil for cardiometabolic health is biased and inaccurate and can lead layperson to doubt evidence-based information. Besides, some media features are related to higher quality, facilitating the identification of most accurate information. This study reinforces the need for more research to develop interdisciplinary interventions and targeted strategies for debunk and correct misinformation in a faster and effective

way, in order to promote nutritional information that leads the public to make more appropriate food choices.

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LISTA DE ABREVIATURAS E SIGLAS

ABESO	Associação Brasileira para o Estudo da Obesidade e Síndrome Metabólica
AG	Ácido graxo
AGCL	Ácido graxo de cadeia longa
AGCM	Ácido graxo de cadeia média
AGS	Ácido graxo saturado
AGM	Ácido graxo monoinsaturado
AGP	Ácido graxo poliinsaturado
apoA	Apoliproteína A
apoB	Apoliproteína B
CC	Circunferência da cintura
CT	Colesterol total
DAC	Doença arterial coronariana
DM2	Diabete melito tipo 2
JAMA	*Journal of the American Medical Association*
HDL-c	*High-density lipoprotein cholesterol*
HON	*Health on the Net*
LDL-c	*Low-density lipoprotein cholesterol*
QUEST	*Quality evaluation scoring tool*
SBEM	Sociedade Brasileira de Endocrinologia e Metabologia
SERP	Search engine result pages
TCM	Triglicerídeos de cadeia média
TG	Triglicerídeos
VCT	Valor calórico total

SUMÁRIO

Esta dissertação de Mestrado será apresentada no formato exigido pelo Programa de Pós-Graduação em Ciências Médicas: Endocrinologia. É constituída de uma introdução em português, um artigo original em inglês e considerações finais e perspectivas futuras em português.

CAPÍTULO I – Referencial Teórico

INTRODUÇÃO

Informações sobre saúde na era digital

Ao longo das últimas décadas, o mundo presenciou uma transformação tecnológica radical que revolucionou o processo de comunicação. No ano de 1995, havia 16 milhões de usuários conectados à rede mundial de computadores, representando 0,4% da população mundial. Este número cresceu para mais de 5 bilhões de usuários no ano de 2021 (64,7% da população mundial)[1]. Esta difusão e popularização da internet ampliou de sobremaneira o acesso à informação e proporcionou o aumento expressivo da produção de informação[2].

Neste contexto, a internet tornou-se uma das principais fontes de obtenção de informações sobre saúde, inclusive muitas vezes sendo o primeiro meio de consulta[3]. Uma pesquisa do *Pew Research Center,* que avalia longitudinalmente o impacto da internet na vida dos americanos, relatou que cerca de 80% da população busca informações médicas e relacionadas à saúde na internet. Os tópicos mais comumente pesquisados são: doenças e problemas de saúde específicos, tratamentos médicos, dieta, nutrição e suplementos, condicionamento físico e medicamentos[2].

A ampliação do acesso à informação por meio da internet possibilita maior conhecimento dos indivíduos leigos sobre suas condições específicas de saúde, tornando-os mais competentes para participar ativamente, junto aos profissionais de saúde que o assistem, da tomada de decisão sobre seu processo de saúde. Além disso, a interatividade proporciona o compartilhamento de dúvidas e experiências, bem como a criação de redes de apoio para pacientes e familiares, sendo um recurso valioso para acolhimento e para o enfrentamento de situações de saúde complexas e dolorosas[4].

Por outro lado, considerando que a internet é um espaço de comunicação que recebe um grande volume de informações sem qualquer tipo de controle editorial[5], é sabido que muitas das informações obtidas sobre saúde são imprecisas, inconsistentes, desatualizadas e sem comprovação científica[4]. As mídias com conteúdo de caráter comercial promovem conteúdos enviesados e pautados em seus próprios interesses financeiros, em detrimento do conhecimento científico[6]. Além

disso, a limitada alfabetização em saúde da maioria da população, pode resultar em má-interpretação e má-aplicação das informações obtidas[6].

Por todas essas razões, se por um lado o amplo acesso às informações de saúde torna o indivíduo empoderado e apto a participar ativamente de seu processo de saúde-doença, por outro o conduz a uma situação de vulnerabilidade. A falsa sensação de segurança proporcionada por um conhecimento incerto e inconsistente pode acarretar práticas de saúde não adequadas e/ou não necessárias, causando prejuízos à nível individual e, em um espectro mais amplo, alcançando danos à nível de saúde pública[4, 6, 7].

A desinformação em saúde na internet

A disseminação de boatos, notícias sensacionalistas e informações imprecisas ocorre desde os primórdios da imprensa. No entanto, o advento da internet tornou, o que antes era divulgado dentro de barreiras geográficas, um fenômeno global[8]. Sabemos que notícias falsas se espalham mais rápido e de forma mais profusa que as informações precisas, uma vez que tendem a ser mais polêmicas, apelativas e a provocar sentimentos ambivalentes nos leitores[9].

Desinformação em saúde conceitualmente é definido como uma informação errada de acordo com o consenso científico e que é propagada com ou sem a intenção de causar prejuízos. Na língua inglesa, existem dois termos que descrevem melhor este conceito. *Misinformation* refere-se a uma informação imprecisa repassada sem a intenção de causar danos. Já *disinformation* é a informação deliberadamente errada, criada com a intenção de causar danos ou para benefício próprio[10].

A desinformação em saúde amplificada pela internet já se mostrou nociva em diversos cenários, como a propagação do movimento antivacina, que tem sido relacionado a surtos recentes de sarampo em países como Reino Unido, Estados Unidos, Alemanha e Itália. As doenças infecciosas e temas relacionados são os que mais envolvem a disseminação de desinformação na internet, seguidos por doenças crônicas não transmissíveis e dietas/nutrição[8]. Por sua natureza complexa e multifatorial, de fato alimentação e nutrição são temas de saúde sujeitos à divulgação de notícias sensacionalistas[11], sendo os sites que promovem este conteúdo classificados como um dos piores em termos de acurácia[12].

A desinformação em saúde surge por inúmeras causas. Em parte demonstra-se intrínseco à construção do conhecimento científico que requer a convergência de múltiplas linhas de evidência para a obtenção de um consenso. Neste processo fragmentado, indícios isolados que posteriormente são refutados e dados desatualizados muitas vezes se disseminam inadvertidamente[13]. Além disso, a tradução da melhor evidência científica para outras camadas da sociedade e para sua implementação prática está sujeita a diversos interferentes[6]. A mídia assume um papel central nesta problemática, uma vez que, seja pela simplificação demasiada da comunicação científica ou pela distorção sensacionalista de fatos para ganho de audiência, pode dar origem a má-interpretações de dados científicos[14]. A tradução do conhecimento também está sujeita a fortes interesses comerciais e governamentais, que distorcem substancialmente a mensagem científica[6].

Na comunicação científica tradicional, o processo de revisão por pares incorpora um rigoroso controle de qualidade nos textos publicados[15]. Na Internet, há intensa produção e compartilhamento de conteúdos que não passam por revisão alguma, tornando necessária a constante filtragem e refinamento das informações obtidas em todos os níveis da cadeia de comunicação[6]. No entanto, é comum que o usuário final da informação apresente baixo nível de alfabetização em saúde eletrônica, ou seja, não possua habilidade individual em buscar, encontrar, avaliar, integrar e aplicar adequadamente o conhecimento em saúde adquirido do meio eletrônico[16].

Na disseminação da desinformação, as crenças anteriores do receptor também se mostram determinantes para sua aceitação como verdade. Isto é, através do viés cognitivo de confirmação, que é a tendência a aceitarmos as informações que reforçam nossas crenças e convicções prévias, ao mesmo tempo que ignoramos aquelas que são contrárias as mesmas, há um reforço da seletividade da informação, que tanto pode gerar, quanto reforçar a desinformação em saúde[6, 10, 13].

Metodologias de avaliação da qualidade de sites de saúde

Nas últimas décadas, em função da demanda originada pela crescente oferta de informações em saúde sem a proteção concedida pela comunicação científica tradicional, observou-se a expansão de pesquisas que procuram responder questões de como avaliar e aprimorar a qualidade da informação disponível na rede. Na verdade, desde o início da Internet, na tentativa de melhorar a qualidade das informações nos sites de saúde, especialistas em informação vêm desenvolvendo *checklists* contendo critérios e indicadores na tentativa de estabelecer padrões de qualidade[15].

A organização suíça *Health on the Net* (HON) foi uma das pioneiras a promover mecanismos para garantir sites confiáveis na área da saúde. Em 1996, criou um selo de qualidade para sites que preenchessem seus oito princípios éticos relacionados à promoção de informações mais qualificadas e seguras. São eles: autoridade (identificar quem fornece a informação), complementaridade (a informação visa apoiar e não a substituir a relação profissional x paciente), confidencialidade (o site deve manter a privacidade dos dados dos usuários), atribuições (referenciar quais as fontes das informações), justificativas (respaldo científico das informações sobre benefícios/resultados de uma prática), transparência na propriedade (clareza e contato para informações adicionais), transparência do patrocínio (clareza sobre apoios financeiros do site), honestidade da publicidade e da política editorial (indicação sobre os responsáveis pelas informações publicadas e distinção clara entre conteúdo editorial e patrocinado)[17]. O selo HONCode é considerado por muitos autores o “padrão ouro”, liderando com o maior número de sites acreditados no mundo[18] e sendo uma das metodologias mais empregadas na análise da qualidade da informação de diferentes tópicos de saúde[19].

A preocupação com a qualidade das informações de saúde publicadas na internet foi uma questão sempre presente. Em 1997, foi publicado um editorial no *The Journal of the American Medical Association* (JAMA) que alertou para as consequências inerentes à disseminação da informação incompleta, enganosa e sem acurácia. Na mesma publicação, os autores definiram quatro critérios para avaliar, controlar e garantir a qualidade da informação em saúde na web: autoria (nomes, credenciais dos responsáveis pelo site); referências (fontes do conteúdo devem ser

apresentadas de forma clara, informações sobre direitos autorais); declarações (fontes de financiamento, conflitos de interesses, política comercial) e atualização[5]. Estes critérios ficaram conhecidos como Silberg criteria ou JAMA benchmark criteria, tornando-se até hoje uma das principais ferramentas aplicadas em estudos para avaliação da qualidade de sites de saúde[19].

Em 1999, o Instituto de Ciências da Saúde da Universidade de Oxford criou o DISCERN, um formulário online desenvolvido para que o próprio usuário avalie a informação sobre uma opção de tratamento de saúde e fornece orientação sobre como analisar a confiabilidade da informação[20]. O *Quality Evaluation Scoring Tool* (QUEST), desenvolvido em 2018, é uma ferramenta validada que inovou na análise da informação ao incorporar questões como o tipo de estudo científico referenciado no texto e o tom do vocabulário empregado, ambos indicativos da imparcialidade e transparência da informação[21].

Muito esforço tem sido empregado para o desenvolvimento de ferramentas que avaliem a qualidade da informação em saúde online e, embora tais ferramentas não resolvam a questão da regulamentação, podem auxiliar usuários finais, profissionais da saúde e pesquisadores a diferenciar fontes de alta e baixa qualidade[22]. No entanto, diversas limitações destes instrumentos precisam ser consideradas. A maioria destas ferramentas não foram validadas e muitas são limitadas no seu escopo de aplicação, além de serem demoradas de aplicar e exigirem habilidades prévias. Nem todas fornecem resultados quantitativos, dificultando a comparação entre diferentes fontes[21].

Uma recente revisão sistemática avaliou 17 ferramentas atualmente em uso e concluiu que, não há um instrumento quantitativo único que tenha passado por um processo de validação, que possa ser usado para uma ampla gama de informações de saúde e atinja equilíbrio entre facilidade de uso e concisão[23]. Cabe ainda lembrar que, mesmo quando a informação aparenta ser de alta qualidade, poderá oferecer riscos aos usuários por incompreensões devido à linguagem inadequada ao público consumidor, sendo a legibilidade outro critério fundamental para a qualidade da informação publicada em sites de saúde, mas nem sempre incorporada às ferramentas de avaliação[24].

Os instrumentos de avaliação existentes pressupõem que, estando as mídias em conformidade com os indicadores de qualidade, provavelmente contém informações mais acuradas. De fato, existem aspectos essenciais sabidos e que

devem ser considerados na filtragem de informações de maior qualidade[22]. No entanto, as relações entre critérios de qualidade do site e validade científica das informações são complexas, logo, as ferramentas, não são capazes de garantir que uma informação, mesmo que adequadamente apresentada, seja verdadeiramente baseada em evidências[25, 26]. Para tanto, faz-se necessário a comparação com um padrão-ouro de qualidade da informação, o que consome tempo e exige conhecimento avançado em saúde, não sendo uma solução prática para o problema das informações imprecisas e carentes de base científica[22].

Infodemiologia

A infodemiologia, ou seja, a epidemiologia das informações de saúde na internet é uma disciplina de pesquisa emergente na interseção da informática médica e saúde pública. O termo foi criado em 2002 por Eysenbach e é definido como a ciência da distribuição e dos determinantes da informação em meio eletrônico, fornecendo aos pesquisadores, profissionais da saúde pública e formuladores de políticas as ferramentas e os dados com o objetivo final de informar e aprimorar a saúde e as políticas públicas[27].

As pesquisas em infodemiologia visam o desenvolvimento, coleta e avaliação de métricas e indicadores para padrões de informação e comunicação que tenha relação com dados epidemiológicos e que sejam úteis para a saúde pública[28]. Embora tenham sido inicialmente desenvolvidas para avaliar a desinformação em saúde, mostraram importante validade na previsão de surtos de doenças infeciosas. Um artigo premiado publicado em 2006 foi o primeiro a mostrar uma correlação entre pesquisas relacionadas à gripe no Google e casos de *influenza* ocorridos na semana seguinte no Canadá[29]. Posteriormente, esta metodologia foi empregada em outro estudo que serviu de base para o desenvolvimento da ferramenta *Google Flu trends*. O uso de dados de infodemiologia para fins de vigilância tem sido denominado infovigilância[28].

A infodemiologia, portanto, analisa tanto a relação entre as demandas de informações de saúde (por meio de análise de dados gerados a partir da pesquisa e do comportamento de navegação dos usuários), quanto o suprimento de informações de saúde (por meio de monitoramento de conteúdo disponível e de postagens em

blogs, sites, redes sociais e outras fontes disponíveis) [28, 30]. Uma revisão dos estudos infodemiológicos entre 2009 e 2018 detectou 338 estudos publicados em 57 periódicos e demonstrou que estes estudos vem crescendo ano após ano. Das 338 publicações, a fonte mais popular de pesquisa foi o Twitter, seguido das ferramentas do Google, sites e plataformas, blogs e fóruns, Facebook e outros mecanismos de pesquisa. Os assuntos pesquisados foram variados, sendo doenças e epidemias os mais populares, enquanto dietas e atividade física foram menos frequentes[27].

Os indicadores infodemiológicos incluem dados agregados e analisados sobre a prevalência e os padrões de informação disponíveis online. Esta ciência parte do pressuposto que mudanças nestes padrões de informação e comunicação podem ser tanto um sintoma precoce de mudança na saúde da população, quanto indicativo de episódios com caráter negativo (como, por exemplo, um “surto” de desinformação) ou positivo (como uma campanha de saúde). Estes dados podem ser aplicados, por exemplo, para a detecção precoce de doenças, direcionamento de campanhas e esforços para contrabalançar a desinformação e para a prevenção e gestão de doenças crônicas à nível populacional[28].

Uma das principais características e grande vantagem da infodemiologia em relação aos métodos de pesquisa tradicionais é a coleta e análise das informações em tempo real, garantindo uma vigilância mais rápida[27, 28, 30]. Outras vantagens significativas são a opção de anonimato que os dados da web oferecem, além da possibilidade de avaliar grandes populações. A principal desvantagem é que os dados podem ser afetados por incidentes repentinos, fornecendo resultados tendenciosos[27].

A infodemiologia vem possibilitando a identificação de lacunas entre a oferta e a demanda de informações e mostrando-se um recurso valioso no gerenciamento de infodemias, ou seja, no combate à quantidade excessiva de informações não filtradas no meio digital[28]. Os estudos infodemiológicos, além de auxiliar na conscientização dos usuários sobre padrões de informação para melhor seleção das informações de saúde, também auxilia os desenvolvedores a projetar redes e sites que maximizem os benefícios da internet para a saúde pública[30]. A tendência futura é a combinação entre fontes de dados tradicionais e eletrônicas para fornecer uma avaliação ainda mais completa[27], sendo um campo altamente interdisciplinar que requer a colaboração de cientistas da computação, epidemiologistas, estatísticos, especialistas em saúde e em comportamento[28].

O óleo de coco: composição e metabolismo

Há milhares de anos, os produtos do coco são considerados valiosos e empregados na medicina tradicional indiana para diversas utilidades terapêuticas[31]. O cultivo do coqueiro se destaca em muitos países, não só pelos aspectos econômicos que proporciona, mas também pelos ganhos sociais e ambientais advindos da exploração sustentável. A maioria dos países que cultivam essa palmeira a utiliza para produção de frutos, com os objetivos de explorarem comercialmente a copra para produção de óleo e coco seco desidratado[32].

A copra, que consiste no endosperma sólido e seco do coco, contém aproximadamente 65 a 75% de óleo. O óleo de coco e seus derivados, devido a sua resistência à oxidação e polimerização, vem sendo empregado há anos em diversas indústrias, como a alimentícia, cosmética, farmacêutica e petroquímica[33]. Na última década, houve um aumento expressivo na produção mundial do óleo de coco, principalmente na sua forma virgem e não refinada[34].

A composição do óleo de coco é peculiar e distingue-se de outras fontes de gordura saturada. Quase sua totalidade (92%) é composta por ácidos graxos saturados (AGS), dentre os quais, 45-50% correspondem ao ácido láurico (C12:0), um ácido graxo com metabolismo misto e baixa ocorrência em alimentos[35]. O restante da fração de AGS é composto por 16% de ácido mirístico (C14:0), 8% de ácido palmítico (C16:0), 15% de ácidos graxos de cadeia média (AGCM) e ácido esteárico (C18:0). Os AG remanescentes são monoinsaturados (AGM) (6%) e polinsaturados (AGP) (2%). Com relação aos ácidos graxos essenciais, apresenta baixa concentração de ácido linoleico (C18:2) e não contém ácido linolênico (C18:3)[31, 35].

Em relação ao metabolismo dos lipídios, após a absorção, os ácidos graxos de de cadeia longa (AGCL) são esterificados em triglicerídeos (TG) nos enterócitos, transportados pelos quilomícrons no sistema linfático e em seguida na corrente sanguínea. Os TG dos quilomícrons são hidrolisados pela lipase lipoproteica dos tecidos periféricos, liberando os AG para serem utilizados como fonte energética ou reesterificados para armazenamento. Já os AGCM não são significativamente incorporados em lipoproteínas, sendo absorvidos diretamente na circulação portal e transportados ao fígado onde serão oxidados e servirão como uma fonte rápida de energia. Algumas evidências sugerem que, devido ao metabolismo mais dinâmico, os

AGCM poderiam estimular a termogênese, diminuir sua deposição no tecido adiposo, aumentar a saciedade, além de não serem responsáveis pelo aumento do colesterol sérico[35, 36].

O ácido láurico, AGS mais abundante no óleo de coco, costuma ser classificado como um AGCM devido ao comprimento de sua cadeia carbônica. No entanto, mostra-se como um AG com propriedades intermediárias entre os AGCM e os AGCL[34, 35, 37, 38]. Em sua revisão sobre o tema, Eyres et al (2016) trazem que, em termos de digestão e absorção, o ácido láurico tem um comportamento mais próximo aos AGCL, uma vez que 70-75% do mesmo é absorvido no intestino e transportado via quilomícrons na circulação. Na comparação, 95% dos AGCM são absorvidos diretamente pela veia porta. Além disso, a maior solubilidade dos AGCM no meio aquoso intestinal, que influencia diretamente a sua velocidade de absorção, ocorre em AG com comprimento de cadeia C10:0 ou menos, premissa que exclui o ácido láurico[34]. Importante salientar que o ácido láurico é o terceiro AGS que mais eleva CT (colesterol total) e LDL-c (*low-density lipoprotein cholesterol*), apresentando um efeito cardiometabólico que se correlaciona com risco cardiovascular, doença coronariana e incidência de diabetes melito tipo 2 (DM2). Além disso, apresenta maior potencial inflamatório quando comparado aos demais AGS[35].

Efeitos do consumo do óleo de coco sobre parâmetros cardiometabólicos

Evidências epidemiológicas de populações indígenas do Pacífico, que culturalmente consomem quantidades substanciais de coco, são frequentemente citadas como prova de que o óleo de coco traria benefícios à saúde cardiovascular. No entanto, a dieta destes povos consiste em baixa ingestão de alimentos ultraprocessados e alta ingestão de peixes, frutas e vegetais, resultando em baixos níveis de colesterol. Ademais, o coco é usado integralmente e não o óleo de coco de forma isolada[39].

No Brasil, um ensaio clínico duplo-cego randomizado ganhou notoriedade quando mostrou significativa redução da circunferência da cintura (CC), da relação LDL:HDL e aumento do HDL-c (*high-density lipoprotein cholesterol)* em mulheres que utilizaram 30ml de óleo de coco diariamente por 12 semanas, quando comparadas ao grupo controle que utilizou óleo de soja. Ambos os grupos apresentaram discreta

redução de peso, porém sem diferença significativa entre eles. Neste estudo, também foram avaliados parâmetros glicêmicos: não foi observada diferença significativa na glicemia entre os grupos. O grupo que recebeu óleo de coco exibiu maior liberação de insulina que, mesmo não sendo estatisticamente significativo, aumentou significativamente o valor de HOMA-S (*Homeostasis Model Assessment*)[40].

Um outro estudo de 2015 comparou os efeitos da suplementação de 13ml/dia de óleo de coco, por 3 meses, em indivíduos em prevenção secundária de doença arterial coronariana (DAC). Os indivíduos foram divididos em grupo controle e grupo intervenção. O grupo intervenção apresentou redução significativa da circunferência da cintura, bem como aumento do HDL-c, apoA e apoB. Os níveis de CT, LDL e TG não apresentaram alterações significativas no período[41].

Um ensaio clínico randomizado com 45 indivíduos saudáveis investigou os efeitos de refeições preparadas com óleo de palma, coco ou oliva virgem sobre marcadores de inflamação e níveis lipídicos. A dieta com óleo de coco apresentou as concentrações mais elevadas de CT, HDL-c e LDL-c quando comparada à dieta com óleo de oliva virgem. A razão CT/HDL-c não mostrou diferença significativa entre os três grupos, bem como os níveis de homocisteína, proteína C reativa e outros marcadores inflamatórios[42].

No estudo de Valente et al (2017), mulheres com excesso de peso foram randomizadas em modelo *crossover* para comparação dos efeitos do óleo de coco e óleo de oliva. Avaliaram-se, dentre outros fatores, marcadores de risco cardiovascular. O óleo de coco não causou efeitos significativo nos níveis de TG, CT, HDL-c, LDL-c, TG/HDL-c, ácido úrico, glicemia e HOMA-IR (*Homeostasis Model Assessment of Insulin Resistance Index)*[37].

O ensaio clínico randomizado de Vijayakumar et al, estudo de intervenção com maior tempo de seguimento, comparou os efeitos do uso do óleo de coco *versus* óleo de girassol como óleo de cozinha em 200 pacientes com DAC estável pelo período de 2 anos. Medidas antropométricas, perfil lipídico, função antioxidante, função endotelial e eventos cardiovasculares foram avaliados em 3 meses, 6 meses, 1 ano e 2 anos. Ao final, os autores concluíram que não houve variação significativa tanto em eventos, quanto em alterações nos fatores de risco cardiovasculares na população estudada após 2 anos de acompanhamento[43].

De modo geral, os estudos avaliando os efeitos do consumo do óleo de coco nos parâmetros de obesidade, perfil lipídico, controle glicêmico e risco cardiovascular

apresentam resultados contraditórios e diversas limitações metodológicas[34]. Nos últimos dois anos, foram publicadas três revisões sistemáticas e metanálises avaliando os efeitos do consumo do óleo de coco em relação a outros óleos sobre parâmetros de saúde cardiovascular[44-46], cujos resultados concordam ao demonstrar que o óleo de coco aumenta significativamente as frações LDL-c e HDL-c, porém, sem benefício na relação CT:HDL. Os estudos também não encontraram benefícios no consumo do óleo de coco para parâmetros de adiposidade, glicêmicos e marcadores inflamatórios, também implicados na saúde cardiovascular, concluindo que o óleo de coco não deve ser visto como uma gordura saudável e seu consumo deve ser limitado devido ao alto teor de gordura saturada.

No ano de 2013, foi publicada a I Diretriz brasileira sobre o consumo de gorduras e saúde cardiovascular, onde os especialistas não recomendaram o óleo de coco para tratamento de hipercolesterolemia [36]. Devido à falta de evidências sobre o efeito do óleo de coco na perda de peso e pelo seu elevado teor de AGS, em 2016, a Associação Brasileira para o Estudo da Obesidade e Síndrome Metabólica (ABESO) e a Sociedade Brasileira de Endocrinologia e Metabologia (SBEM) emitiram um posicionamento contra a utilização terapêutica e rotineira do óleo de coco[47]. Além disso, no ano de 2017, em uma revisão sobre gorduras, a *American Heart Association* (AHA) se posicionou contra o consumo de óleo de coco uma vez que as evidências existentes mostravam aumento significativo na fração LDL-c, um parâmetro mundialmente empregado e aceito para avaliação de risco cardiovascular, enquanto, pecavam em demonstrar outros efeitos favoráveis do alimento[48].

A promoção do óleo de coco nas mídias

Com base em pressupostos mecanismos de ação e respaldados em evidências pouco robustas[34, 40, 41], na última década, propagou-se na mídia o conceito dos efeitos benéficos do consumo do óleo de coco na perda de peso, melhora do perfil lipídico e redução de risco para diabetes e doença cardiovascular[34, 49, 50]. Essas alegações foram reforçadas por uma conjuntura favorável à popularização do alimento com a ascensão do veganismo e de dietas da moda, como a paleolítica e a cetogênica[49, 51, 52]. O que se sucedeu foi um aumento expressivo no interesse e no consumo do óleo de coco pela população à nível mundial[34, 37].

Uma pesquisa *online* foi realizada nos Estados Unidos em 2016, onde 2000 participantes responderam sobre o quão saudável julgavam ser os alimentos incluídos em uma lista pré-definida, sendo o óleo de coco um dos itens. As repostas do público foram comparadas com a avaliação realizada por uma equipe de nutricionistas em relação aos mesmos alimentos. A pesquisa revelou que 72% dos americanos classificaram o óleo de coco como um alimento saudável, contra apenas 37% dos nutricionistas[53]. Tamanha discordância entre leigos e especialistas pode ser possivelmente explicada pelo intenso marketing envolvendo o alimento nas diferentes mídias nos últimos tempos[48, 52, 53].

A maioria das publicações da internet e de profissionais da saúde que divulgam os supostos benefícios do óleo de coco baseiam-se na ideia equivocada de que seu principal constituinte, o ácido láurico, formaria triglicerídeos de cadeia média (TCM), cuja metabolização é distinta das demais gorduras da dieta. Supõe-se que seu rápido metabolismo poderia contribuir para a perda de peso e para a melhora de fatores de risco cardiometabólicos[54]. No entanto, além da falta de evidências que suportem essa teoria[55], estes achados referem-se ao consumo do óleo TCM, uma mistura de C8:0 e C10:0, não englobando o ácido láurico[56]. Dessa forma, o óleo de coco não deve ser considerado sinônimo de TCM, sendo inadequada a extrapolação comumente realizada das evidências científicas dos TCM para o óleo de coco[34, 38, 49].

Segundo uma reportagem do Jornal *The Washington Post* (2018), o óleo de coco desfrutou um pico de popularidade entre os anos de 2011 e 2015. Entre janeiro de 2011 a janeiro de 2013, as buscas por “óleo de coco” mais que dobraram no *Google Trends*. Porém, após o posicionamento da *American Heart Association* (AHA) de 2017, contrário ao consumo do óleo pelo seu elevado teor de gordura saturada, observou-se uma queda de 24,3% nas vendas do produto. Em agosto de 2018, o discurso de Karin Michels, professora da Escola de Saúde Pública de Harvard, em uma palestra na Universidade de Freiburg na Alemanha, teve grande repercussão mundial em sites de notícias. Na ocasião, a professora declarou que óleo de coco é um “veneno e um dos piores alimentos para consumir” [57, 58].

2 JUSTIFICATIVA

Nas últimas décadas, o uso da Internet como fonte de informações de saúde evoluiu rapidamente. As informações sobre saúde, doenças e dieta obtidas na Internet, sem dúvida, afetam o comportamento dos pacientes e suas decisões de saúde[2, 4]. Portanto, a disseminação da desinformação, que são informações imprecisas, incompletas ou em desacordo com o consenso científico atual, tornou-se uma preocupação de saúde pública[6].

Como resultado, a partir dessa necessidade iminente, houve um aumento no interesse e no número de estudos que abordam a qualidade e a precisão das informações online sobre temas diversos de saúde, bem como a avaliação da alfabetização em saúde da população[8, 16, 28]. Porém, como se trata de uma ciência emergente, um maior número de dados e evidências faz-se necessário para auxiliar no preenchimento de lacunas desse conhecimento, como ocorre no caso da nutrição.

O óleo de coco é um alimento que, apesar da falta de embasamento científico em relação aos supostos benefícios de saúde, incluindo dados que demonstrem que seu consumo leve à redução da incidência de doença cardiovascular e diabetes, e mesmo contrário ao posicionamento de especialistas, ganhou notoriedade nas mídias, principalmente na Internet, e conquistou um extenso mercado consumidor na última década[34, 48, 49, 51].

A hipótese que este estudo pretende confirmar é que, em relação ao óleo de coco e seus benefícios sobre os parâmetros de obesidade, perfil lipídico e controle glicêmico, a comunicação em saúde realizada através de sites da internet é tendenciosa, apresenta baixo grau de confiabilidade e não se baseia em evidências científicas.

3 OBJETIVOS

3.1 Objetivo Geral

Avaliar globalmente, por meio de pesquisa em sites da internet do Brasil, África do Sul, Austrália, Estados Unidos, Índia e Reino Unido, o conteúdo publicado sobre os efeitos do consumo do óleo de coco na saúde cardiometabólica.

3.2 Objetivos Específicos

3.2.1 Avaliar o perfil dos sites que veiculam informações sobre óleo de coco e saúde.

3.2.2 Avaliar o posicionamento dos sites sobre o consumo do óleo de coco como opção de tratamento para emagrecimento, distúrbios do colesterol e triglicerídeos e controle glicêmico.

3.2.3 Avaliar, entre os países, a diferença de posicionamento dos sites sobre o consumo do óleo de coco em relação aos parâmetros metabólicos.

3.2.4 Avaliar se as informações veiculadas nos sites estão em conformidade com as evidências científicas atuais.

3.2.5 Avaliar a qualidade dos sites de saúde selecionados aplicando-se critérios internacionais de acreditação.

3.2.6 Contribuir com uma metodologia de pesquisa para futuros estudos infodemiológicos na área da nutrição e definir modelos que ajudem elaborar estratégias de prevenção da desinformação em nutrição

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CAPÍTULO II – Artigo Original

Original Paper

Assessment of the quality and accuracy of online health information on coconut oil consumption: a cross-sectional multinational study

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Summary

Background: In relation to coconut oil consumption, there is divergence between the scientific opinion and online information. Even with evidence demonstrating that coconut oil's intake raises LDL-cholesterol and does not improve cardiometabolic parameters, its consumption is widely promoted in media. We aimed to analyze online information the public is globally exposed regarding the effect of coconut oil on cardiometabolic health.

Methods: A systematic search was carried out in Google.com using the terms "coconut oil" and "health". Selected webpages from six countries (Brazil, United States, United Kingdom, South Africa, India and Australia) were peer reviewed by two independent and blinded researchers and assessed for quality and popular claimed cardiometabolic outcomes.

Findings: Only 20·43% of the websites (n=411) had JAMA score⩾3, which is a high-quality indicator. From the total assessed webpages (n=560), most encouraged coconut oil intake (66·1%) and indicated improvement in lipid profile (60·7%), weight loss (60·2%), cardiovascular risk reduction (58·8%), waist circumference reduction (21·8%) and glycemic control (20·4%). Citation of official health entities lowered the probability to encourage its use (PR=0·275, 95%CI 0·195-0·389, p<0·001). Contrarily, Indian and commercial websites had increased probability to encourage coconut oil intake, as well as promotion of most claimed cardiometabolic benefits.

Interpretation: The overall quality of online information relating to coconut oil consumption and metabolic outcomes is unreliable. However, it is possible through this infodemiology study**,** identify variables related to greater accuracy, enabling greater control of misinformation in internet.

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Introduction

The internet has dramatically changed the way people seek and share information worldwide.[1] There has never been so much information available with 72% of Internet users looking online for health information.[2] The use of the Internet in seeking health information can increase patients' knowledge and engagement in health decision-making strategies.[1,3] However, concerns have been raised once available online information may be inaccurate, incomplete or biased. Besides, the lack of technical knowledge by laypeople may unable its critical interpretation, presumably leading to non-evidence-based practices.[1,4]

Coconut oil has seen a surge in popularity in the beginning of the last decade due to claimed, but not enough evidence, health benefits, ranging from weight loss, preventing heart disease, improving cholesterol, among others. They are in contrast to medical guideline recommendations, advocating its consumption with caution due to its high saturated fat lipid composition.[5] Recent meta-analysis of clinical trials raised concern about high consumption of coconut oil because it increases LDL-cholesterol. Besides, there is no evidence of coconut oil advantage over nontropical vegetable oils for cardiometabolic endpoints.[6]

Due to its multifactorial nature, diet and nutrition are health topics prone to the dissemination of sensationalized stories and misinformation.[7] Oversimplification of scientific news by the media usually can lead to misunderstanding.[8] Additionally, some players can bias shared information in a specific health topic for commercial benefits.[9] So, infodemiology, *the study of the distribution and determinants of health information in an electronic medium,* earns huge relevance for debunking misinformation. Infodemiology metrics can provide tracking for knowledge translation gaps, information

prevalence and monitoring seeking behavior to provide best quality of health online information.[10]

This study evaluated online information and seeks behavior regarding the effect of coconut oil on cardiometabolic health. The main purpose was, throughout this model, to gather a picture of the quality and accuracy of information the public is globally exposed on diet.

Methods

Data Collection

We developed a cross sectional study searching for the terms “coconut oil” and “health” in Google.com because it has over 90% of the search engine market share.[11] One researcher conducted the search by using Google Chrome on a personal computer after logging out from any Google account and under the Incognito Mode. In order to have a global panel, we selected a representative country from each continent. Online searches were limited to six locations (Australia, Brazil, India, South Africa, United Kingdom and United States), two languages (Portuguese and English), from January 1, 2011 to April 1, 2019. This period was selected because there was an increase in oil consumption noticed as of mid-2011.[12] All the uniform resource locators (URL) returned in the six search engine result pages (SERP) were evaluated. The eligibility criterion was webpages that had information on health effects of coconut oil consumption as food or supplement. Were excluded webpages that: had information about coconut oil use rather than the eligible criterion, presented video or audio only, sponsored links, duplicated websites, access restricted by subscription or fees and/or had non-accessible links. We transferred the selected URLs to a spreadsheet and

made an electronic capture of each website. The flow chart describing how the data were collected is shown in Figure 1.

Classification of Websites

Pairs of trained independent and blinded researchers characterized selected websites and their webpages. Disagreements were discussed until they agreed on a classification. Assessment of websites and webpages was performed according the following parameters:

1. Classification of websites affiliation as follows: Professional (P), Health institution (I), Education (E), Health portal (HP), Governmental (G), Journalism (J), Commercial (C) and Other (O).
2. Trustworthiness of websites using the Journal of the American Medical Association (JAMA) score and the presence of the HONCode seal, both important metrics for assessing the quality of health sites.[13,14] Their criteria are presented in the supplementary material.
3. Categorization of webpage by date of publication, report author (presence or absence and health professional), mention of scientific references or guidelines about the effects of coconut oil consumption.
4. The viewpoint of the webpage, i.e., pro, against or neutral regarding coconut oil consumption, cautions and related health outcomes as described in Table 1.

Comparison of Online Claims with Evidence-Based Information

We additionally analyzed the accuracy of the information published from each webpage. In order to assess this data, we used summarized measures of a published systematic review and meta-analysis of clinical trials relating coconut oil consumption

and cardiovascular risk factors as a referential for the strength of scientific evidence available for the quoted outcomes.[6]

Internet Search Behavior: Analysis of Google Trends Data

Google Trends generates a graph, where the horizontal axis represents time and the vertical axis indicates how often a term was searched relative to the total number of searches, with “100” representing peak search interest, “0” being no search interest, and numerals in between indicating a percent of the total peak interest at any given time.[15]

We retrieved Google Trends data on the keyword “coconut oil” following search specific criteria:

- To assess seeking behavior for coconut oil we conducted worldwide and country-level searches with a time frame from 2004 (the year when the tool became available) until April 2019. We downloaded a .csv file for each search and created a database for the interest volume per term from which scatter plots were created. Each individual point represents perceived interest for the corresponding month and year along the x-axis. Fitted spline polynomial trend lines were chosen to best fit the data, an approach used to best approximate trends over a range of data points.[16]
- To explore potential relationships between events with global impact and interest for coconut oil, we conducted a worldwide search with a shorter time frame (from January 1st, 2017 to January 1st, 2019). The first event was the publication of a Review from American Heart Association (AHA) on July 15th, 2017, stating against coconut oil intake.[17] The second was the speech of Professor Karin Mitchels, from Harvard TH Chan School of Public Health, in a lecture at the University of Freiburg, in

August 22nd, 2018, where she said coconut oil “is one of the worst foods you can eat”.[18,19]

Statistical Analysis

Data were treated as categorical variables and expressed as frequency, except the JAMA score that was considered a quantitative variable. A two-tailed Chi square test was used to compare frequencies. The Kruskal-Wallis test was conducted to detect differences in JAMA scores among groups. Multivariate analysis of Poisson with robust variance models with backward elimination (all the independent variables with P<0,2 in univariate analysis entered into the equation first and each one is deleted one at a time if they do not contribute to the regression equation) were constructed to determine whether the website viewpoint (dependent variable) was significantly influenced by webpages characteristics. Data were analyzed with the Statistical Package for Social Science (version 23.0; SPSS, Chicago, USA). Statistical significance was set at P<0.05.

Role of the funding source

The funder of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

RESULTS

Distribution of websites

Affiliation in all 411 websites were: journalism (33·3%), commercial (27·5%), others (16·1%) and health portal (11·2%). Other predefined typologies represented each less

than 10% of the total. Frequency of affiliations between countries was statistically significant (p<0·001) and the distribution is shown in Table 2.

Analysis of trustworthiness

Of the 411 websites analyzed, only one (0·2%) did not fit any of the JAMA benchmark criteria, 32 websites (7·8%) achieved 1 criterion, 294 websites (71·5%) achieved 2 criteria, 83 websites (20·2%) achieved 3 criteria and one (0·2%) achieved all 4 criteria. Authorship was the most well-adhered benchmark followed by currency, with 403 (98·1%) and 383 (93·2%) websites respectively. The most commonly missed criteria were attribution (12 websites, 2·9%) and disclosure (75 websites, 18·2%), mainly because of the omission of content sources, financial details and conflicts of interest. Since most websites matched only two benchmark criteria and a minor percentage scored in the extremes, median JAMA score for overall SERP was 2, IQR [2,2].

The distribution of the websites' JAMA score was statistically different according affiliation (p<0·001) as described in Table 3. The highest JAMA score was in education (median 3, IQR, [3,3]) and governmental (median 3, IQR, [2,3]). For other affiliations, the median was 2 with slight differences in range.

As websites with JAMA score ≥ 3 are considered of high quality, we also analyzed the percentages of them for each country/affiliation. The proportion of JAMA score ≥ 3 was 20·4% and there was a statistically significant difference among countries (p<0·001). Of the 84 websites with JAMA score ≥ 3, 34 (40·5%) were from United States, 21 (25%) from Australia, 13 (15·5%) from United Kingdom, 9 (10·7%) from Brazil, 4 (4·8%) from India and 3 (3·6%) from South Africa, being significantly higher in the first two countries. When stratified these potentials high quality websites by affiliation (p<0·001), journalism had the highest frequency (35, 41·7%), followed by health

portals (18, 21·4%), others (8, 9·5%), education (6, 7·1%), commercial (5, 6%), professional, health institution and government (4, 4·8% each).

Only ten of the 411 websites presented the HONcode certification, nine out of ten from the United States and one from Brazil. Health portals had the highest frequency (7/10), followed by health institutions (2/10) and education (1/10). Despite being the two most frequent affiliation in the SERP, none of the journalism and commercial websites displayed the HONcode certification.

Content Analysis and Comparison of Online Claims with Evidence-Based Information

To get an insight into the accuracy, we extracted possible scientific sources of information of each publication. In general, webpages are poor in scientific references, where quote of health entities statements had the most frequency (34·1%), followed by scientific publications (24·1%). Health professional authors also had a low frequency (17·7%) in the whole search.

Among webpages with clear stance on coconut oil indication (n=466), most of them (66·1%) encourage intake, with statistically significant different indications across countries ($p<0·001$). While United States (45·7%) and United Kingdom (50%) presented lower frequencies of encouragement when compared with other countries, India (89·1%) and South Africa (88·2%) presented the higher frequencies. When we breakdown webpages by affiliation ($p<0·001$), Education (12·5%) and Journalism (39·6%) were associated with lower frequencies while Commercial (98·4%) with a higher one.

We analyzed whether webpages, even encouraging use, could indicate caution in the consumption. From the 308 webpages, 42·5% (n=171) advise some caution and remaining webpages either did not mention any indication of caution (n=231) or did not encourage intake (n=158). We performed some sensitive analysis to depict about webpages that advise caution. Having a health professional author was statistically indifferent (p=0·202). Meanwhile, webpages published after July, 2017 (date when AHA published its review) were more inclined to advise caution (p=0·013). As expected, among affiliations (p<0·001), the one that least advised caution was commercial webpages (24·21%), contrasting with journalism that presented the top proportion (59·32%).

Multivariate regression models were performed to best describe which variables have impact in the encouragement of coconut oil intake (Table 4). While journalism webpages, citation of health entities position statements and an advanced date reflect less probability of encouraging coconut oil intake, Indian and commercial webpages reflect greater probability. Journalism webpages also demonstrated a positive probability of advising caution, in opposition to Indian webpages which were less likely to suggest caution.

We visited each webpage looking for their point of view about cardiometabolic parameters (Figure 2). Lipid profile improvement was the most prevalent claim (60·7%), followed by weight loss (60·2%), cardiovascular risk reduction (58·7%), waist circumference reduction (21·7%) and glycemic control (20·3%).

As commercial and journalism websites represented 60·8% of the whole search and due to related financial interest, we analyzed if coconut oil benefits would be mentioned with higher frequencies by commercial websites. Commercial webpages have much

higher frequencies for encouraging use and suggesting benefits for all clinical indications than journalism webpages, indicating a strong bias (Figure 3).

By multivariate analysis, webpages from India were more likely to claim coconut oil intake for weight loss, lipid profile improvement, cardiovascular risk reduction and waist circumference reduction than not Indian webpages (Table 5). Commercial webpages were associated with an increased probability to express benefits for weight loss, lipid profile improvement, cardiovascular risk reduction and glycemic control. On the other hand, Journalism webpages were less likely to promote coconut oil for weight loss and webpages from the United States were less likely to claim coconut oil intake for waist circumference reduction. Finally, webpages that cited health entities statements were associated with a lessen probability to express all claimed benefits with coconut oil intake searched in this study.

In order to have an insight in the accuracy of information, we listed webpages where coconut oil intake was claimed to be beneficial in contrast with the best current evidence (Table 6). Despite lipid profile improvement being the most investigated outcome in clinical trials and the second most cited claim by webpages, evidence does not support any benefit. Although weight loss had most webpages with positive stance and a reasonable number of clinical trials, evidence points to an insignificant role of coconut oil for such outcome.

Internet Search Behavior: Analysis of Google Trends Data

Search volume for “coconut oil” indicated considerable variability over the time interval queried (Figure 4). Based on fitted polynomial trend line for worldwide and trends for all countries, we can observe a pronounced increase in mid 2010 and 2011 which was

sustained until June 2017, when a downward trend is notable. Similar pattern can be observed among almost all countries. These findings corroborate with both the emergence of coconut oil like a superfood in the beginning of last decade and its decay globally observed.[20]

As Google trends is a promising tool for health surveillance,[16] we wondered if it could identify patterns changes in seeking for information reflected by global impact events in the trajectory of coconut oil in the last decade. In Figure 5, we can see highlighted peaks that coincide with the date of the two referenced events in Methods. This short analysis corroborates with previous literature that indicates Google Trends as a valuable tool for infoveillance.[21]

DISCUSSION

Over the past decades, the internet has evolved to become an essential part of society and dramatically changed the way we obtain information.[22] This rise in internet usage has led to the growth of infodemiology to improve public health,[10] which motivated our study to assess quality, accuracy and seek behavior of online health information related to coconut oil.

We observed a high proportion of journalism (33·3%) and commercial (27·5%) websites affiliation returned by search. Commercial websites scored the lowest in terms of JAMA score, were more likely to encourage coconut oil intake and displayed an extensive divergence on claim for coconut oil benefits when compared with evidence-based information, indicating its strong financial bias. On the other hand, although journalism websites had an average JAMA score, it demonstrated more trustworthiness when reporting on the alleged benefits and were more inclined to advise caution while consumption, reflecting a more reliable posture among affiliations.

India is one of the biggest producers of coconut oil in the world and the product has a valuable place in Indian culture.[23,24] It was not a surprise that being an Indian webpage independently had an increased probability to encourage coconut oil intake without advising caution and claimed almost all searched cardiometabolic outcomes. Overall, the analysis seems to indicate more trustworthiness of websites from the United States and Australia, with the highest proportion of websites with JAMA score ≥3, also, American websites showed nine of the ten HONcode certified websites.

The JAMA score and HONcode certification are considered essential instruments for the evaluation of health websites quality.[25] However, as previous reported,[26] these both indicators do not necessarily reflect the quality of information as well as its accordance with scientific evidence. In our study, being ranked as a high-quality website by JAMA score was not determinant for reliability of information. Unfortunately, the low number of HONcode-accredited websites made correlations with quality of information unfeasible.

While technical quality criteria, such as the presence of disclosure and conflicts of interests are relatively easy to measure, the concepts of accuracy usually require the presence of evidence-based information as a gold standard to determine the reliability of a content.[9] We compared the claimed cardiometabolic benefits for coconut oil in our sample with one published meta-analysis on the subject, which we considered the best current evidence.[6] Our results endorse the huge gap between recommendations on web against evidence-based information and also how a misconception about health can be built and widely promoted from the internet. We expected that when the content was developed by a health professional, the information would be more accurate.

Unfortunately, this hypothesis was not confirmed, indicating that having a specialist title might be insufficient parameter for the reliability of information.

Infoveillance is a useful tool in public health, once makes it possible to detect outbreaks of misinformation and intervene assertively[10] and can measure the success of health campaigns in driving information-seeking behaviors.[16] We could check the sensibility of Google Trends to detect changes in seeking behavior for coconut oil as a reflection of important facts evolving coconut oil. We also perceived a relationship between trends with the market since the points of growth and fall for wholesales of coconut oil and internet interest in the term are close.

We set a wide time interval analysis to check if time was determinant in viewpoint changes about coconut oil once scientific information is constantly updated through new findings. It was observed a tendency to encourage less intake, as well as a more caution stance in relation to claimed benefits, at the end of the period. The exposure to contradictory health messages in the media lead people to doubt health researches, campaigns and nutritional recommendations.[27] We attributed to contradiction one of the reasons why this advance in posture towards coconut oil has been so slow. On the other hand, it is clear that reiterated citation of reliable sources, such as health entities statements, were decisive for more accurate information.

Recently, a model called “the wedding cake” proposed a hypothesis of the emergence of misinformation. It establishes four layers of stakeholders (science, policy and healthcare practice, news media and social media) and states that knowledge translation among audiences is subject to misinterpretation due to potential influencing factors such as politics, commercial interests and selective reporting.[9] In the coconut oil case, there was clearly a failure in science knowledge translation, and, once media

and social networks are much larger layers than science, it takes a lot of effort to reverse information spread among them. Besides, it has been already tested that a social positive influence creates a tendency of forward positive ratings,[28] so, when information about coconut oil benefits disseminated, this bias over collective intelligence further reinforced the common sense of coconut oil as a healthy fat even with lack of evidence.

Based on our study, we suggest some safety measures to ensure reliability of online information. Websites must guarantee transparency about sponsors and possible conflict of interest. Avoid commercial websites when intention is to find out about a health issue. Look for the source of information: vague references can cause confusion; citation of official sources is more trustworthy and it must be updated. Specialist health titles do not necessarily confer accurate information, since beliefs can prevail over scientific evidence. Webpages content with a lot of benefits over a single food can be as seductive as risky, once it is easier to believe that a single food could improve health than to face its multivariate condition.

There are several limitations to this study. Beyond the fluidity of internet content, search engine results are based on a complex algorithm that takes into account location of the searcher. Even delimiting the search region, the IP address used for search is associated with a geographical location. Other considerable variables are the selected search terms and date. Although we did not investigate social networks, we consider that 560 analyzed webpages provide a reasonable sample of the existing information on the web. There were inherent challenges in the classification of websites affiliation and webpages viewpoint due to subjectivity even with concepts defined in advance. However, researchers were trained and disagreements were

resolved by pair consensus. Additionally, the best evidence for coconut oil health outcomes is a meta-analysis where many of the clinical trials included had limitations which could have introduced biases in their results.

In conclusion, the overall quality of online information relating to coconut oil intake and metabolic outcomes is unreliable. Websites with higher scores of quality by JAMA score did not offer superior-quality information. Information provided by health specialists was not more accurate and financial interests biased scientific findings. This exposes the need for public health policy makers to better disseminate evidence-based information through creating marketing campaigns addressing myths that arise from the internet and developing eHealth literacy in the population. Infodemiology metrics can enable and facilitate this policy development, implementation and communication, helping to control misinformation in the internet field.

Contributors

CRA, ACD and FG conceived and designed the study. BFS, CRA, ENM, GN, HR, IM, LSA, MM, SG, and PNM were responsible for data extraction. BS, CRA, SG, and FG designed the statistical analysis. CRA, BFS, and SG did the analysis. All authors accessed and verified the dataset. CRA drafted the figures manuscript text and all authors contributed to the interpretation of findings and edits of the Article. FG provided overall supervision of the project. CRA and FG had full access to all data and take final responsibility to submit for publication.

Declaration of interests

We declare no competing interests.

Data sharing

All data related to the study will be shared by email address immediately following publication with no end date to researchers who provide a methodologically sound proposal with the intent to achieve aims in the approved proposal.

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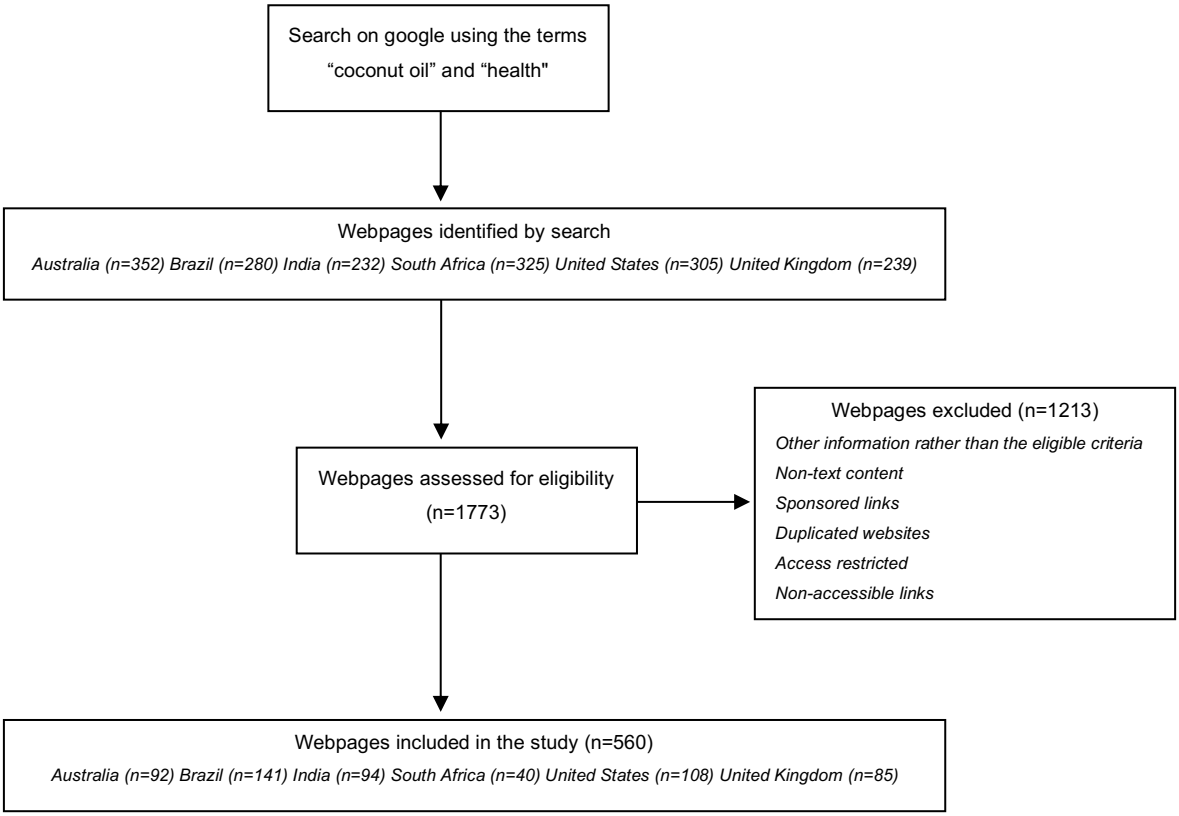

Figure 1. Flow chart depicting the systematic selection of webpages.

Table 1. Health outcomes used to classify websites content

Outcome	Description
Lipid profile	Coconut oil consumption improves lipid profile or increases HDL or decreases LDL and/or triglycerides.
Weight loss	Coconut oil consumption helps weight loss or fat burn or boost metabolism.
Waist circumference	Coconut oil consumption helps to reduce waist circumference and/or abdominal obesity and/or visceral fat.
Cardiovascular risk	Coconut oil consumption helps to reduce cardiovascular risk and diseases.
Glycemic control	Coconut oil consumption helps to improve glycemic control or insulin sensitivity or insulin resistance or type 2 diabetes control.

Table 2. Composition of the SERP by affiliation of websites (n=411).

Affiliation	Whole search (n=411)	AUS (n=71)	BR (n=107)	IN (n=62)	SA (n=37)	USA (n=76)	UK (n=58)
Professional	4·4	12·0	2·1	0·0	0·0	1·9	4·7
Health Institution	4·6	9·8	3·5	4·3	2·5	4·6	0·0
Education	1·5	4·3	0·0	0·0	0·0	4·6	0·0
Health Portal	11·2	8·7	16·3	3·2	5·0	30·6	8·2
Governmental	1·5	2·2	0·7	2·1	0·0	0·9	1·2
Journalism	33·3	27·2	40·4	41·5	22·5	34·3	51·8
Commercial	27·5	23·9	22·0	29·8	57·5	8·3	20·0
Other	16·1	12·0	14·9	19·1	12·5	14·8	14·1
Total	100·0	100·0	100·0	100·0	100·0	100·0	100·0

Data are expressed as a percentage of the total for SERP. Color intensity indicates the frequency of the different affiliation in each SERP: light green <10%, medium green 10-30% and dark green >30%. Abbreviations: SERP = search engine result pages.

Table 3. Descriptive statistics of JAMA scores by affiliation

Outcome	Whole search (411)	P (18)	HI (19)	E (6)	HP (46)	G (6)	J (137)	C (113)	O (66)
Mean (SD)	2.12 (0·53)	2.17 (0·51)	2.16 (0·50)	3.0 (0·00)	2.41 (0·54)	2.67 (0·51)	2.23 (0·48)	1.88 (0·43)	1.97 (0·55)
Median	2	2	2	3	2	3	2	2	2
Minimum	0	1	1	3	2	2	1	1	0
Maximum	4	3	3	3	4	3	3	3	3

Abbreviations: Professional (P), Health institution (I), Education (E), Health portal (HP), Governmental (G), Journalism (J), Commercial (C) and Other (O).

Table 4. Multivariate analysis of Poisson with robust variance model using webpages encouragement of coconut oil intake as the dependent variable and backward elimination of webpages characteristics (independent variables).

	PR	95% CI	P
Journalism webpages			
Yes	0·759	0·637 – 0·903	0·002
No	1		
Citation of health entities position statements			
Yes	0·275	0·195 – 0·389	<0·001
No	1		
Date of publication			
Before August-2018	1		
After August-2018	0·825	0·712-0·956	0·11
Indian webpages			
Yes	1·191	1·087-1·305	<0·001
No	1		
Commercial webpages			
Yes	1·201	1·099-1·313	<0·001
No	1		

Dependent variable: encouragement of coconut oil intake. Reference group for all independent variables: not to have the characteristic. Outcome of backward stepwise logistic regression, cut-off for exclusion p>0·05. Predictors not retained in model: Brazil, United States, United Kingdom and South Africa's websites, Top 10 Google websites, Health related websites, JAMA score≥3, Date of publication July-2017, Reference citation. Abbreviations: PR: prevalence ratio; CI: confidence interval.

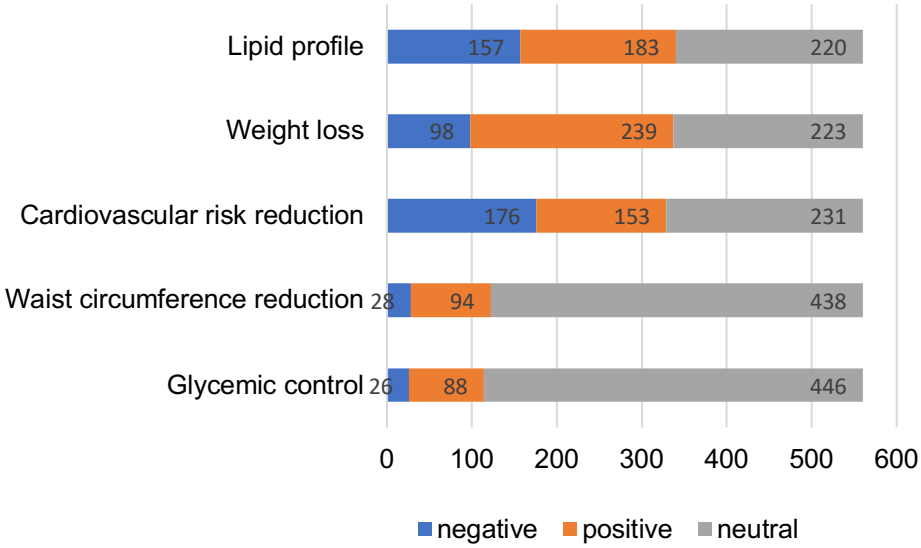

Figure 2. Claims mentioned in webpages with different stance on coconut oil intake. Data are expressed as frequencies for each clinical indication in the whole SERP (n=560). Abbreviations: SERP=search engine result pages.

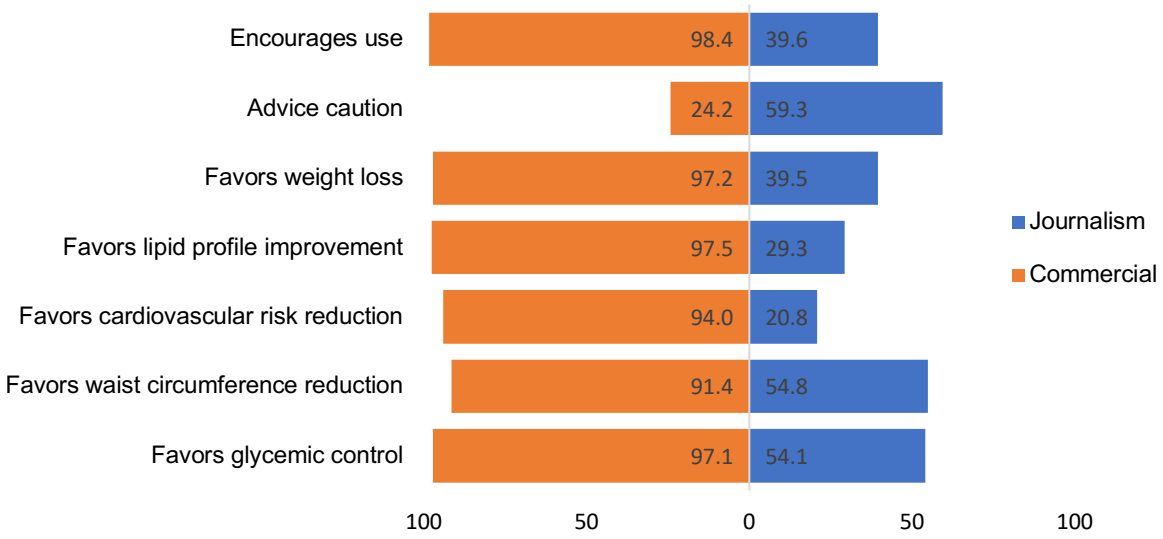

Figure 3. Comparative of coconut oil claimed benefits by journalism and commercial webpages. Data are expressed as a percentage of webpages with positive stance for each outcome and affiliation.

Table 5. Multivariate analysis of Poisson with robust variance models using website claim for metabolic benefit as the dependent variable and backward elimination of webpages characteristics (independent variables).

	Weight Loss (WL)	Lipid profile improvement (LP)	Cardiovascular risk reduction (CR)	Waist circumference reduction (WC)	Glycemic control (GC)
	PR (95%CI)	PR (95%CI)	PR (95%CI)	PR (95%CI)	PR (95%CI)
Commercial	1·22** (1·09-1·35)	1·65** (1·41-1·93)	1·60** (1·35-1·90)	--	1·26* (1·08-1·48)
India	1·20** (1·08-1·32)	1·32** (1·16-1·51)	1·29* (1·11-1·50)	1·28* (1·09-1·51)	--
United States	--	--	--	1·29* (1·09-1·52)	--
Journalism	0·64* (0·50-0·82)	--	--	--	--
Citation of position statements	0·43** (0·30-0·60)	0·22** (0·14-0·36)	0·15** (0·09-0·27)	0·36** (0·20-0·64)	0·49* (0·29-0·78)

Dependent variable: claimed metabolic benefits WL, LP, CR, WC, GC. Reference group for all independent variables: not to have the characteristic. Outcome of backward stepwise logistic regression, cut-off for exclusion p<0,05. Predictors not retained in model: United States websites (LP, CR), United Kingdom websites (all outcomes), India websites (GC), South Africa websites (LP, WC), Australia websites (LP), Commercial websites (WC), Journalism websites (LP,CR,WC,GC), Health related websites (WL,LP,CR), Top 10 Google websites (LP,CR,WC,GC), JAMA ≥3 (all outcomes), Date of publication July-2017 (WL,LP,CR), Date of publication August-2018 (all outcomes), Reference citation (WL,LP,CR). Abbreviations: PR=prevalence ratio, CI=confidence interval. *P<0·01; **P<0·001

Table 6. Comparative between webpages with clear position about coconut oil and evidence-based information.

	Webpages with positive stance	Number of clinical trials	Evidence favoring coconut oil intake
Lipid profile improvement (n=340)	53·9%	17	No
Weight loss (n=337)	70·9%	8	Indifferent
Waist circumference reduction (n=122)	77·0%	4	Indifferent
Glycemic control (n=114)	77·.2%	4	Indifferent

Data for webpages with clear position by clinical indication in whole SERP (search engine result pages) are expressed as frequencies. Data for webpages with positive stance are expressed as a percentage of webpages with clear position. Data for clinical trials indicate the number of occurrences in 2020 meta-analysis and evidence was based on the inclination of the pooled estimate for each clinical indication.[6]

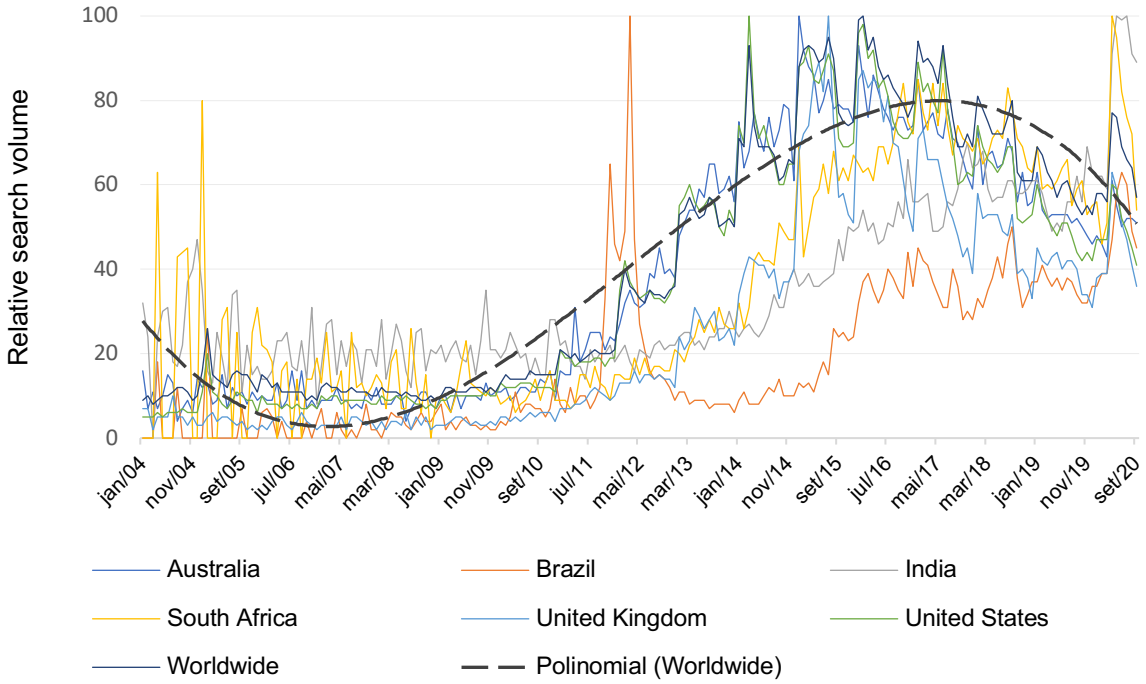

Figure 4. Trends in search volume for “coconut oil” per country and worldwide. January 1st 2004 to September 1st 2020.

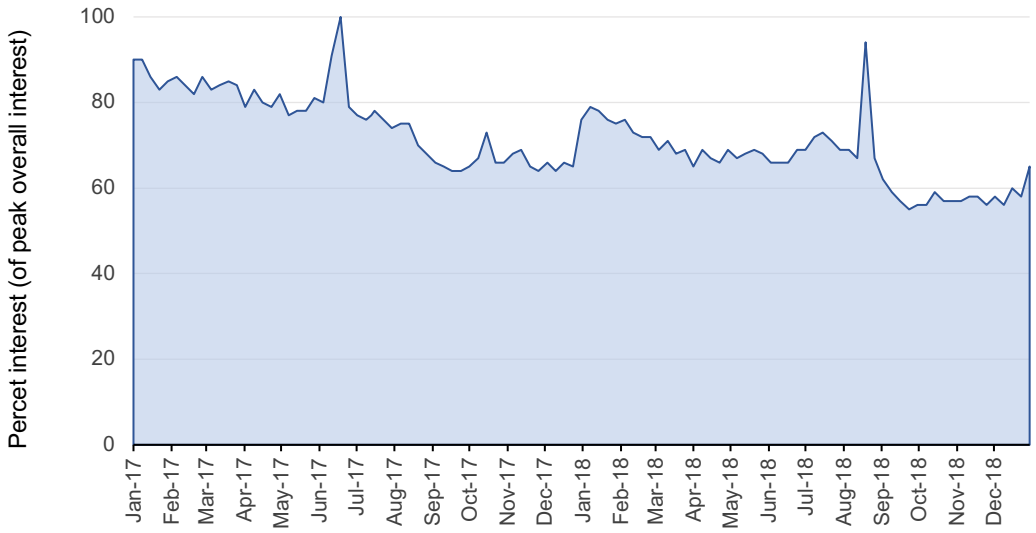

Figure 5. Trends in search volume for “coconut oil”. Worldwide. January 1st, 2017 to January 1st, 2019.

Supplementary Material

JAMA criteria

The JAMA benchmarks evaluate four core standards: website authorship (authors, contributors, affiliations, and credentials), attribution (references and sources for all content, copyright information), disclosures (website ownership, sponsorship, advertising, commercial funding, potential conflicts of interests), and currency (updated information less than one year ago). All websites were evaluated according to JAMA criteria and received a score of 1 if the information was present or 0 if absent or unclear, resulting in a maximum score of 4. JAMA score of 3 or above has been suggested to be as of high quality.

HON-Code principles

Authoritative	Any medical or health advice provided and hosted on this site will only be given by medically trained and qualified professionals unless a clear statement is made that a piece of advice offered is from a non-medically qualified individual or organization.
Complementarity	The information provided on this site is designed to support, not replace, the relationship that exists between a patient/site visitor and his/her existing physician.
Privacy	Confidentiality of data relating to individual patients and visitors to a medical/health Web site, including their identity, is respected by this Web site. The Web site owners undertake to honor or exceed the legal requirements of medical/health information privacy that apply in the country and state where the Web site and mirror sites are located.
Attribution	Where appropriate, information contained on this site will be supported by clear references to source data and, where possible, have specific HTML links to that data. The date when a clinical page was last modified will be clearly displayed (e.g. at the bottom of the page).
Justifiability	Any claims relating to the benefits/performance of a specific treatment, commercial product or service will be supported by appropriate, balanced evidence in the manner outlined above in Principle 4.
Transparency	The designers of this Web site will seek to provide information in the clearest possible manner and provide contact addresses for visitors that seek further information or support. The Webmaster will display his/her E-mail address clearly throughout the Web site.
Financial disclosure	Support for this Web site will be clearly identified, including the identities of commercial and non-commercial organizations that have contributed funding, services or material for the site.
Advertising policy	If advertising is a source of funding it will be clearly stated. A brief description of the advertising policy adopted by the Web site owners will be displayed on the site. Advertising and other promotional material will be presented to viewers in a manner and context that facilitates differentiation between it and the original material created by the institution operating the site.

Selected links

Post	Link
1	https://www.minhavida.com.br/alimentacao/tudo-sobre/16776-oleo-de-coco
2	https://www.bbc.com/portuguese/geral-42588520
3	https://saude.abril.com.br/bem-estar/saiba-como-usar-o-oleo-de-coco-sem-prejudicar-a-saude-do-seu-coracao/

4	https://saude.abril.com.br/alimentacao/cuidado-com-oleo-de-coco-pedem-cardiologistas/
5	https://saude.abril.com.br/alimentacao/eficacia-do-oleo-de-coco-e-contestada-por-medicos/
6	https://drjulianopimentel.com.br/alimentacao/beneficios-do-oleo-de-coco/
7	https://www.tuasaude.com/como-usar-o-oleo-de-coco/
8	https://www.yamuna.com.br/blogs/dicas_e_receitas/20-beneficios-do-oleo-de-coco-para-sua-saude
9	https://saude.abril.com.br/alimentacao/descubra-se-o-oleo-de-coco-ajuda-a-emagrecer/
10	https://veja.abril.com.br/saude/oleo-de-coco-e-veneno-afirma-especialista-de-harvard/
11	https://belezaesaude.com/oleo-de-coco/
12	https://saude.estadao.com.br/noticias/geral,oleo-de-coco-e-veneno-puro-diz-pesquisadora-de-harvard,70002468601
13	https://minutosaudavel.com.br/oleo-de-coco/
14	https://www.minhavida.com.br/alimentacao/materias/31412-oleo-de-coco-entenda-quando-ele-pode-prejudicar-sua-saude
15	https://www.mundoboaforma.com.br/9-beneficios-do-oleo-de-coco-para-que-serve-e-propriedades/
16	https://boaforma.abril.com.br/dieta/dieta-do-oleo-de-coco-4-quilos-em-15-dias/
17	https://revistagalileu.globo.com/Ciencia/noticia/2018/08/oleo-de-coco-vilao-ou-heroi-polemica.html
18	https://www.bbc.com/portuguese/geral-40302638
19	https://veja.abril.com.br/saude/saiba-porque-o-oleo-de-coco-nao-e-tao-saudavel-quanto-voce-pensa/
20	https://www.minhavida.com.br/alimentacao/materias/29459-como-usar-oleo-de-coco-para-emagrecer-e-hidratar-cabelo-e-pele
21	https://www.gazetadopovo.com.br/viver-bem/saude-e-bem-estar/oleo-de-coco-grande-besteira-segundo-medica-harvard/
22	https://gauchazh.clicrbs.com.br/saude/noticia/2018/08/oleo-de-coco-e-veneno-puro-diz-professora-de-harvard-cjl56rc1i03dj01qkvoxsiylb.html
23	http://globoesporte.globo.com/eu-atleta/nutricao/noticia/2016/08/azeite-ou-agua-de-coco-ambos-sao-beneficos-mas-e-preciso-moderacao.html
24	https://gauchazh.clicrbs.com.br/saude/vida/noticia/2017/04/queridinho-da-dieta-oleo-de-coco-pode-fazer-mal-a-saude-9768582.html
25	http://www.revistavidaesaude.com.br/destaques/oleo-de-coco-na-berlinda/
26	https://blog.zonacerealista.com.br/13-estudos-sobre-o-oleo-de-coco-e-seus-efeitos-na-saude/
27	https://www.correiobraziliense.com.br/app/noticia/ciencia-e-saude/2018/08/22/interna_ciencia_saude,701373/oleo-de-coco-e-veneno-puro-diz-pesquisadora-de-harvard.shtml
28	https://www.opas.org.br/o-oleo-de-coco-e-seus-beneficios-para-o-corpo/
29	https://www.gazetaonline.com.br/bem_estar_e_saude/2018/08/-oleo-de-coco-e-veneno-puro--diz-professora-de-harvard-1014145167.html
30	https://extra.globo.com/noticias/saude-e-ciencia/oleo-de-coco-tao-prejudicial-saude-quanto-manteiga-21484555.html
31	https://vivabem.uol.com.br/noticias/bbc/2018/01/09/oleo-de-coco-e-realmente-saudavel-nosso-medico-responde.htm
32	https://www.unimedfortaleza.com.br/blog/alimentacao/beneficios-oleo-de-coco-para-alimentacao
33	https://claudia.abril.com.br/saude/oleo-de-coco-nao-benefico-mal-saude/
34	https://www.brasildefato.com.br/2018/04/23/oleo-de-coco-na-alimentacao-tem-seus-beneficios-mas-deve-ser-usado-com-moderacao/
35	http://gooutside.com.br/pare-de-cozinhar-com-oleo-de-coco/
36	https://www.minhavida.com.br/alimentacao/listas/14901-7-beneficios-ao-consumir-oleo-de-coco
37	https://consultaremedios.com.br/oleo-de-coco-catarinense/p#descricao
38	https://www.guiadasemana.com.br/bem-estar/noticia/conheca-10-beneficios-do-oleo-de-coco-e-aprenda-a-fazer-em-casa
39	https://www.prasempresaude.com.br/oleo-de-coco-60-capsulas-1000mg-ada
40	https://www.dietaesaude.com.br/dietas/24-dieta-do-oleo-de-coco
41	https://www.oleodecoco.org/beneficios.html
42	https://drvictorsorrentino.com.br/os-beneficios-do-oleo-de-coco/
43	https://www.ecycle.com.br/6144-oleo-de-coco.html
44	https://drrocha.com.br/oleo-de-coco-extra-virgem/
45	https://www.natue.com.br/natuelife/conheca-os-beneficios-do-oleo-de-coco.html

46	https://www.conquistesuavida.com.br/noticia/oleo-de-coco-e-saudavel-descubra-6-mitos-ou-verdades-sobre-esse-alimento_a6702/1
47	https://www.feitodeiridium.com.br/oleo-de-coco-queima-de-gordura/
48	https://saude.abril.com.br/alimentacao/a-verdade-sobre-os-oleos/
49	https://www.tribunapr.com.br/noticias/brasil/oleo-de-coco-nao-faz-bem-a-saude-e-pode-trazer-maleficios/
50	http://www.prosaudelojas.com.br/10-motivos-para-apostar-no-oleo-de-coco/
51	http://ego.globo.com/beleza/noticia/2017/04/oleo-de-coco-o-mocinho-virou-vilao-para-saude-e-beleza.html
52	https://emais.estadao.com.br/noticias/bem-estar,conheca-os-beneficios-do-oleo-e-do-acucar-de-coco-para-a-sua-saude,1764293
53	http://www.blog.saude.gov.br/promocao-da-saude/29919-oleo-de-coco-para-emagrecer-pode-ter-efeito-contrario-se-for-usado-em-excesso
54	https://vivabem.uol.com.br/noticias/redacao/2018/08/22/oleo-de-coco-e-puro-veneno-diz-professor-de-harvard-devemos-usar.htm
55	https://www.diariodepernambuco.com.br/app/noticia/vida-urbana/2017/04/09/interna_vidaurbana,698364/alerta-para-os-perigos-do-oleo-de-coco.shtml
56	http://www.copraalimentos.com.br/wp-content/uploads/2017/07/Oleo-de-Coco-Extravirgem-alimento-com-energia-vital-um-aliado-da-saude-e-do-bem-estar.pdf
57	https://brasil.elpais.com/brasil/2018/08/23/ciencia/1535025183_757902.html
58	https://www.greenme.com.br/morar/faca-voce-mesmo/5139-oleo-de-coco-101-usos
59	https://www.diariodepernambuco.com.br/app/noticia/ciencia-e-saude/2018/08/22/internas_cienciaesaude,760795/oleo-de-coco-e-veneno-puro-diz-pesquisadora-de-harvard.shtml
60	https://www.diariodepernambuco.com.br/app/noticia/vida-urbana/2017/04/09/interna_vidaurbana,698364/alerta-para-os-perigos-do-oleo-de-coco.shtml
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64	http://www.naomaispelo.com.br/noticia/10-beneficios-do-oleo-de-coco-virgem/
65	https://www.jolivi.com.br/lair-ribeiro-oleo-de-coco/
66	https://www.drogariaspacheco.com.br/flora-7-ervas-oleo-de-coco-extra-virgem-60-capsulas/p
67	https://www.maissaudeebeleza.com.br/d/21/oleo-de-coco
68	http://nutrichefsbiopora.com/tag/oleo-de-coco/
69	https://www.edin.com.br/oleo-de-coco-extra-virgem-500ml-qualicoco
70	https://www.mundoboaforma.com.br/oleo-de-coco-para-que-serve-como-funciona-beneficios-e-como-usar/
71	http://revistacorpore.com.br/portal/afinal-o-oleo-de-coco-faz-ou-nao-faz-bem-para-a-saude/
72	https://www.proteste.org.br/alimentacao/seguranca-alimentar/noticia/oleos-de-coco-sao-aprovados-em-nosso-teste
73	http://www.farmaceuticas.com.br/oleo-de-coco-e-suas-propriedades/
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75	https://www.terra.com.br/vida-e-estilo/saude/saude-bucal/atualidades/oleo-de-coco-combate-bacteria-que-faz-parte-da-flora-bucal,f44ee67739373410VgnVCM10000098cceb0aRCRD.html
76	https://gauchazh.clicrbs.com.br/saude/vida/noticia/2017/06/oleo-de-coco-nao-e-saudavel-afirma-entidade-norte-americana-9817950.html
77	https://blog.onemarket.com.br/sem-categoria/oleo-de-coco-mitos-e-verdades/
78	https://pleno.news/comportamento/especialista-de-harvard-diz-que-oleo-de-coco-e-veneno.html
79	https://vivabem.uol.com.br/noticias/redacao/2017/06/19/queda-de-um-mito-oleo-de-coco-faz-tao-mal-a-saude-quanto-manteiga.htm
80	https://www.nutrii.com.br/blog/entenda-como-o-oleo-de-coco-age-no-seu-organismo/
81	https://www.remedio-caseiro.com/10-dicas-de-uso-do-oleo-de-coco-no-dia-a-dia/
82	https://www.remedio-caseiro.com/comece-a-tomar-oleo-de-coco-e-perca-peso-em-poucos-dias/
83	https://www.fmiligrama.com.br/p/1040/oleo-de-coco-em-po-nucipure---reduzindo-medidas-abdominais-com-saude
84	https://drrocha.com.br/beneficios-do-oleo-de-coco-para-o-seu-corpo/

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86	https://www.ecycle.com.br/6394-oleo-de-coco-extravirgem
87	https://www.mercearіadanatureza.com.br/produto/oleo-de-coco-extra-virgem-qualicoco-200ml-89008
88	https://phytoterapica.com.br/site/blog/informativo-de-outono-do-oleo-de-coco-extra-virgem/
89	https://www.lojafolhaverde.com.br/oleo-de-coco-extra-virgem-200ml-unilife
90	https://anamariabraga.globo.com/materia/verdade-ou-mito-aprenda-como-usar-o-oleo-de-coco/
91	https://www.proteste.org.br/alimentacao/seguranca-alimentar/noticia/o-oleo-de-coco-nao-emagrece
92	https://www.zonacerealista.com.br/oleo-de-coco-extra-virgem-unilife-200ml.html
93	https://catracalivre.com.br/saude-bem-estar/especialistas-contestam-oleo-de-coco-e-apontam-riscos-saude/
94	http://www.julianagoes.com.br/7-beneficios-do-oleo-de-coco-na-beleza-e-na-saude/
95	https://www.einstein.br/noticias/noticia/quais-tipos-oleos-quais-diferencas-entre-eles
96	https://www.gazetaonline.com.br/bem_estar_e_saude/2018/08/uma-bomba--diz-medico-capixaba-sobre-consumo-de-oleo-de-coco-1014145480.html
97	https://www.ecycle.com.br/6157-oleo-de-coco-emagrecer.html
98	https://consultaremedios.com.br/oleo-de-coco-organico-copra/p#descricao
99	https://lunetas.com.br/afinal-o-oleo-de-coco-faz-bem-ou-mal-para-a-saude-das-criancas/
100	https://www.naiak.com.br/alimentos-e-bebidas/40-2-oleo-de-coco.html
101	https://www.bifarma.com.br/produto/nutramix-oleo-de-coco-1000mg-com-60-capsulas-55097
102	https://www.tudosaudavel.com/categoria-produto/suplementos-e-vitaminas/suplementos/oleo-de-coco-suplementos/oleo-de-coco-in-natura/
103	https://melhorcomsaude.com.br/6-beneficios-do-oleo-de-coco/
104	https://veja.abril.com.br/saude/oleo-de-coco-para-emagrecer-nao-passa-de-bobagem/
105	https://istoe.com.br/oleo-de-coco-e-puro-veneno-diz-professora-de-harvard/
106	https://www.conquistesuavida.com.br/noticia/6-motivos-para-utilizar-o-oleo-de-coco-na-sua-alimentacao_a6867/1
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CAPÍTULO III – Considerações Finais e Perspectivas Futuras

CONSIDERAÇÕES FINAIS E PERSPECTIVAS FUTURAS

A acessibilidade facilitada à informação proporcionada pela internet possibilitou a disseminação de desinformações em saúde de forma mais rápida e mais ampla do que nunca. Como consequência, o acesso fácil e persistente a informações de saúde conflitantes, imprecisas e enviesadas sobre tópicos como nutrição e doenças pode ter implicações prejudiciais para a saúde individual e coletiva. A desinformação ocorre como consequência de um conjunto complexo de fatores que influenciam o julgamento, como forte viés comercial, componentes da psicologia humana, descrença na ciência e baixo nível de alfabetização em saúde, o que torna a desconstrução da desinformação um verdadeiro desafio de saúde pública.

Este estudo fornece, até onde sabemos, a primeira evidência do grau de desinformação online mundial na última década em relação aos efeitos do consumo de óleo de coco sobre a saúde cardiometabólica. Nossos resultados mostram que as informações fornecidas através de sites da internet sobre os benefícios do óleo de coco são, de uma maneira geral, tendenciosas e imprecisas. Uma vez que, segundo o melhor grau de evidência vigente, o consumo do óleo de coco (quando comparado a outros óleos vegetais não tropicais) eleva LDL-c e HDL-c, porém sem benefício na relação CT:HDL-c, além de não apresentar nenhum efeito sobre parâmetros de adiposidade, glicêmicos e marcadores inflamatórios, não há qualquer embasamento para indicação do seu uso com a intenção de melhorar a saúde cardiometabólica como refere boa parte do conteúdo online disponível. Dessa forma, fica claro como a desinformação em nutrição pode induzir a população a realizar escolhas alimentares nem sempre adequadas ou necessárias e ainda com potenciais prejuízos à saúde.

Estudos infodemiológicos como o desenvolvido, que, além de dados descritivos, introduzem métricas analíticas são capazes de identificar características das mídias que mais se relacionam com o grau de adequação das informações disponibilizadas. Nesse estudo, as ferramentas de avaliação da qualidade de sites de saúde não ofereceram informações de maior qualidade do ponto de vista da acurácia, ou seja, da concordância com a melhor evidência atual disponível. Além disso, informações isoladas de especialistas não foram as mais acuradas e os interesses financeiros claramente enviesaram os dados científicos a respeito do óleo de coco.

Uma vez que o meio digital tende a ganhar cada vez mais espaço na mediação da saúde individual e coletiva, é preciso intervenções eficazes que reduzam a vulnerabilidade dos usuários à desinformação, prevenindo comportamentos prejudiciais ou inúteis relacionados à saúde. As iniciativas automatizadas de checagem das informações são pouco promissoras, uma vez que dependem do funcionamento de algoritmos desenvolvidos por empresas privadas e com fortes interesses comerciais. Portanto, o meio de combate à desinformação parece exigir muito mais engenharia social do que conhecimento tecnológico.

Percebe-se, a partir deste cenário, a necessidade de investir no desenvolvimento do pensamento crítico individual e coletivo, habilitando os usuários da rede a identificarem padrões de comunicação relacionados à desinformação. Neste sentido, faz-se fundamental intervenções de saúde pública que promovam maior alfabetização em saúde eletrônica, minimizando a influência da exposição seletiva e polarizada às informações. Além disso, as organizações de saúde e profissionais que baseiam suas condutas na medicina baseada em evidências devem usar sua difusão e presença online para disseminar informações adequadas nas comunidades que atendem.

Outro ponto que deve ser amplamente explorado é o monitoramento do comportamento e interesse dos usuários da rede, uma vez que possibilita a identificação de erros de tradução da informação científica, surtos de desinformação e tendências de práticas em desacordo com as bases científicas. Desta forma, é possível informar prioridades para a pesquisa, comunicação em saúde e educação, direcionando de forma assertiva as iniciativas e campanhas de saúde pública para a conscientização da população com vistas à desconstrução de desinformações no âmbito da saúde e à promoção de escolhas alimentares mais adequadas.

Como perspectiva futura final, esperamos que este trabalho possa estimular e servir de base para aplicação em outras questões controversas de saúde e nutrição que possibilitarão o direcionamento de estratégias para o combate à desinformação. Mais pesquisas são necessárias para desenvolver intervenções interdisciplinares e estratégias direcionadas para compreender e combater este fenômeno social da desinformação em saúde cada vez mais presente e significativo.